

Name_____

Chemistry I: Periodic Table Unit Worksheet

Period_____

Date_____ (25 pts)

The Periodic Table

SECTION 6.1 ORGANIZING THE ELEMENTS (pages 155–160)

This section describes the development of the periodic table and explains the periodic law. It also describes the classification of elements into metals, nonmetals, and metalloids.

Searching For an Organizing Principle (page 155)

1. How many elements had been identified by the year 1700? _____

2. What caused the rate of discovery to increase after 1700? _____

3. What did chemists use to sort elements into groups? _____

Mendeleev's Periodic Table (page 156)

4. Who was Dmitri Mendeleev _____

5. What property did Mendeleev use to organize the elements into a periodic table?

6. True or false? Mendeleev used his periodic table to predict the properties of undiscovered elements. _____

The Periodic Law (page 157)

7. How are the elements arranged in the modern periodic table? _____

8. True or false? The periodic law states that when elements are arranged in order of increasing atomic number, there is a periodic repetition of physical and chemical properties. _____

Metals, Nonmetals, and Metalloids (pages 158–160)

9. Explain the color coding of the squares in the periodic table in Figure 6.5. _____

10. Which property below is not a general property of metals? _____

a. ductile

c. malleable

b. poor conductor of heat

d. high luster

11. True or false? The variation in properties among metals is greater than the variation in properties among nonmetals. _____

12. Under some conditions, a metalloid may behave like a _____ .

Under other conditions, a metalloid may behave like a _____ .

SECTION 6.2 CLASSIFYING THE ELEMENTS (pages 161–167)

This section explains why you can infer the properties of an element based on the properties of other elements in the periodic table. It also describes the use of electron configurations to classify elements.

Squares In the Periodic Table (pages 161–163)

13. Label the sample square from the periodic table below. Label *element name*, *element symbol*, *atomic number*, and *average atomic mass*.

12
Mg
Magnesium
24.03

14. List three things, other than the name, symbol, atomic number, and average atomic mass, you can discover about an element using the periodic table in Figure 6.9.

a. _____

b. _____

c. _____

Electron Configurations in Groups (pages 164–165)

15. True or false? The subatomic particles that play the key role in determining the properties of an element are electrons. _____

16. Why are Group A (columns 1-2 & 13-18) elements called representative elements?__

17. Classify each of the following elements as a (an) *alkali metal*, *alkaline earth metal*, *halogen*, or *noble gas*.

a. sodium _____ **e.** xenon _____

b. chlorine _____ **f.** potassium _____

c. calcium _____ **g.** magnesium _____

d. fluorine _____

18. For elements in each of the following groups, how many electrons are in the **highest** occupied energy level?

a. Group 13 _____

b. Group 1 _____

c. Group 18 _____

Transition Elements (page 166)

19. Complete the table about classifying elements according to the electron configuration of their highest occupied energy level.

Category	Description of Electron Configuration
Noble gases	
Alkaline metals	
Alkaline Earth metals	
Halogens	
Transition metals	
Other metals	

20. Circle the letter of the elements found in the *p* block.

- a.** Groups 1 and 2 and helium
- b.** Groups 3 to 12 except for helium
- c.** transition metals
- d.** Halogens (Group 17)

SECTION 6.3 PERIODIC TRENDS (pages 170–178)

This section explains how to interpret group trends and periodic trends in atomic size, ionization energy, ionic size, and electronegativity.

Trends in Atomic Size (pages 170–171)

21. True or false? The radius of an atom can be measured directly. _____

22. What is the general trend in atomic size within a group? _____

Within a period? _____

23. What are the two variables that affect atomic size within a group?

a. _____

b. _____

24. For each pair of elements, pick the element with the largest atom.

a. Helium and argon _____

b. Potassium and argon _____

Ions (page 172)

25. What is an ion? _____

26. How are ions formed? _____

27. An ion with a positive charge is called a(n) _____ ; an ion with a negative charge is called a(n) _____ .

28. Complete the table about anions and cations.

	Anions	Cations
Charge?		
Metal or nonmetal?		

Trends in Ionization Energy (pages 173–175)

29. _____ is the energy required to overcome the attraction of protons in the nucleus and remove an electron from a gaseous atom.

30. Why does ionization energy tend to decrease from top to bottom within a group?

31. Why does ionization energy tend to increase as you move across a period? _____

32. There is a large increase in ionization energy between the second and the third ionization energies of a metal. What kind of ion is the metal likely to form? Include the charge in your answer. _____

Trends in Ionic Size (page 176)

33. Metallic elements tend to _____ electrons and form _____ ions. Nonmetallic elements tend to _____ electrons and form _____ ions

34. Which ion has the larger ionic radius: Ca^{2+} or Cl^- ? _____

35. What property of an element represents its tendency to attract electrons when it chemically combines with another element? _____

36. Use Table 6.2 on page 177. What trend do you see in the relative electronegativity values of elements within a group? _____

Within a period? _____

37. Circle the letter of each statement that is true about electronegativity values.

- a.** The electronegativity values of the transition elements are all zero.
- b.** The element with the highest electronegativity value is sodium.
- c.** Nonmetals have higher electronegativity values than metals.
- d.** Electronegativity values can help predict the types of bonds atoms form.

Summary of Trends (page 178)

38. Use Figure 6.22 on page 178. Circle the letter of each property for which aluminum has a higher value than silicon.

- | | |
|-----------------------------------|-----------------------------|
| a. first ionization energy | c. electronegativity |
| b. atomic radius | d. ionic radius |